

WHAT IS CLAIMED IS:

1 1. A method for preventing dopant leaching from a doped structural film
2 during fabrication of a microelectromechanical system, the method comprising:
3 producing a microstructure that includes the doped structural film, sacrificial
4 material, and metallic material by a combination of techniques selected from the group
5 consisting of deposition, patterning, and etching;
6 dissolving the sacrificial material with a release solution, the release solution
7 comprising a substance destructive to the sacrificial material and acting as an electrolyte to
8 form a galvanic cell with the doped structural film and metallic material acting as electrodes;
9 and
10 suppressing effects of the galvanic cell by including a nonionic detergent
11 mixed in the release solution.

1 2. The method recited in claim 1 wherein the release solution comprises
2 an acid.

1 3. The method recited in claim 2 wherein the acid is HF.

1 4. The method recited in claim 1 wherein the doped structural film
2 comprises a doped semiconductor.

1 5. The method recited in claim 4 wherein the doped structural film
2 comprises doped silicon.

1 6. The method recited in claim 5 wherein the doped structural film
2 comprises doped polysilicon.

1 7. The method recited in claim 1 wherein the sacrificial material
2 comprises an oxide.

1 8. The method recited in claim 7 wherein the oxide is a silicon oxide.

1 9. The method recited in claim 7 wherein the oxide comprises alumina.

1 10. The method recited in claim 1 wherein the sacrificial material
2 comprises a nitride.

- 1 11. The method recited in claim 10 wherein the nitride is a silicon nitride.
- 1 12. The method recited in claim 7 wherein the sacrificial material
2 comprises photoresist.
- 1 13. The method recited in claim 1 wherein the metallic material comprises
2 gold.
- 1 14. The method recited in claim 1 wherein the metallic material comprises
2 aluminum.
- 1 15. The method recited in claim 1 wherein the metallic material comprises
2 copper.
- 1 16. The method recited in claim 1 wherein the metallic material comprises
2 platinum.
- 1 17. The method recited in claim 1 wherein the metallic material comprises
2 nickel
- 1 18. The method recited in claim 1 wherein the nonionic detergent
2 comprises an alkyl group and a polyether-linked hydroxy group commonly linked to an aryl
3 group.
- 1 19. The method recited in claim 18 wherein the nonionic detergent
2 comprises a Triton X™ detergent.
- 1 20. The method recited in claim 18 wherein the nonionic detergent
2 comprises Triton X-100.™
- 1 21. The method recited in claim 20 wherein the Triton X-100™ is included
2 in the release solution with a concentration approximately between 0.01 and 0.1 vol. %.
- 1 22. The method recited in claim 1 wherein the nonionic detergent
2 comprises Igepal CA-630.™
- 1 23. The method recited in claim 1 wherein the nonionic detergent
2 comprises Nonidet P-40.™

1 24. The method recited in claim 1 wherein the nonionic detergent
2 comprises a hydrophilic moiety and a hydrophobic moiety commonly linked to an aryl group.

1 25. The method recited in claim 1 wherein the microelectromechanical
2 system is surface micromachined.

1 26. The method recited in claim 1 wherein the microelectromechanical
2 system comprises part of a mirror array for use in a wavelength router.

1 27. A microelectromechanical system made according to the method
2 recited in claim 1.

1 28. A method for preventing dopant leaching from a doped polysilicon
2 structural film during fabrication of a surface micromachined mirror array having a plurality
3 of moveable reflective surfaces for use in a wavelength router, the method comprising:
4 producing a mirror microstructure that includes the doped polysilicon,
5 sacrificial silicon oxide material, and gold by a combination of techniques selected from the
6 group consisting of deposition, patterning, and etching;
7 dissolving the silicon oxide material with a release solution, the release
8 solution comprising HF and acting as an electrolyte forming a galvanic cell with the doped
9 polysilicon structural film and gold acting as electrodes; and
10 suppressing effects of the galvanic cell by including a nonionic detergent
11 mixed in the release solution.

1 29. The method recited in claim 28 wherein the nonionic detergent
2 comprises an alkyl group and a polyether-linked hydroxy group commonly linked to an aryl
3 group.

1 30. The method recited in claim 29 wherein the nonionic detergent
2 comprises a Triton XTM detergent.

1 31. The method recited in claim 29 wherein the nonionic detergent
2 comprises Triton X-100.TM

1 32. The method recited in claim 28 wherein the nonionic detergent
2 comprises a hydrophilic moiety and a hydrophobic moiety commonly linked to an aryl group.

1 33. A surface micromachined mirror array made according to the method
2 recited in claim 28.

1 34. A method for fabricating a routing mechanism for use in a wavelength
2 router of the type configured to receive, at an input port, light having a plurality of spectral
3 bands and to direct subsets of the spectral bands to respective ones of a plurality of output
4 ports by providing optical paths in a free-space optical train disposed between the input ports
5 and the output ports and by providing the routing mechanism to direct a given spectral band
6 to different output ports depending on a state of a dynamically configurable routing unit in
7 the routing mechanism, the method comprising:

8 forming a plurality of such dynamically configurable routing units on a doped
9 structural film with sacrificial material and metallic material by a combination of techniques
10 selected from the group consisting of deposition, patterning, and etching;

11 dissolving the sacrificial material with a release solution, the release solution
12 comprising a substance destructive to the sacrificial material and acting as an electrolyte
13 forming a galvanic cell with the doped structural film and metallic material acting as
14 electrodes; and

15 suppressing the effects of the galvanic cell by including a nonionic detergent
16 mixed in the release solution,

17 whereby dopant leaching from the doped structural film due to the effects of
18 the galvanic cell is suppressed.

1 35. The method recited in claim 34 wherein the nonionic detergent
2 comprises an alkyl group and a polyether-linked hydroxy group commonly linked to an aryl
3 group.

1 36. The method recited in claim 35 wherein the nonionic detergent
2 comprises a Triton X™ detergent.

1 37. The method recited in claim 35 wherein the nonionic detergent
2 comprises Triton X-100.™

1 38. The method recited in claim 34 wherein the nonionic detergent
2 comprises a hydrophilic moiety and a hydrophobic moiety commonly linked to an aryl group.

1 39. The method recited in claim 34 wherein the release solution comprises
2 HF, the doped structural film comprises doped polysilicon, the sacrificial material comprises
3 a silicon oxide, the metallic material comprises gold, and the nonionic detergent comprises
4 Triton X-100.™

1 40. A routing mechanism made according to the method recited in claim
2 39.

1 41. A routing mechanism made according to the method recited in claim
2 34.

1 42. A wavelength router comprising a routing mechanism made according
2 to the method recited in claim 34.